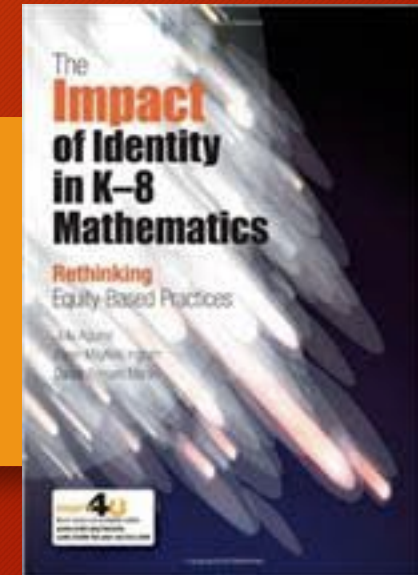


Rethinking Equity-Based Practices

The Impact of Identity in K-8 Mathematics

Julia Aguirre, Karen Mayfield-Ingram, and Danny Bernard Martin

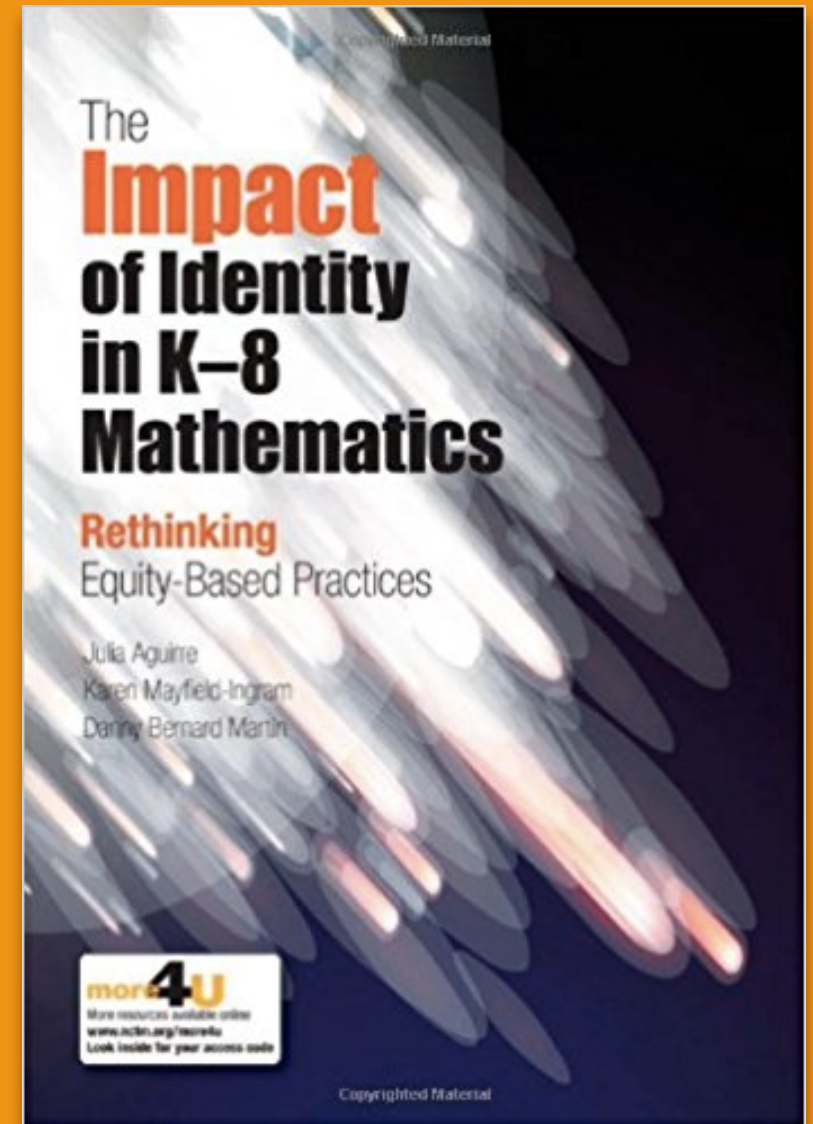


Catherine Vittorio, San Bernardino County Superintendent of Schools



The Impact of Identity in K-8 Mathematics

- Part I of the book focuses on mathematics learning and identity.
- Part 2 of the book describes five equity-based instructional practices:
 - 🎬 Going deep with mathematics
 - 🎬 Leveraging multiple mathematical competencies
 - 🎬 Affirming mathematics learners' identities
 - 🎬 Challenging spaces of marginality
 - 🎬 Drawing on multiple resources of knowledge.

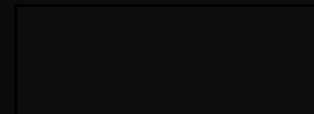


Quote of the Day



Until we get equality in education,
we won't have an equal society.

— *Sonia Sotomayor* —



What are equity-based practices?

*Crockett, 2008; Gutiérrez, 2013b; Walshaw, 2010.
Jacobs, Lamb, & Philipp, 2010 Wager, 2014*



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TEACHERS OF MATHEMATICS

Reflecting - Equity-based teaching requires a substantial amount of reflection, which involves not just reflecting on your pedagogy and your classroom norms, but also considering how you identify yourself and how others identify you.

Noticing- Noticing generally refers to paying attention to students' mathematical thinking, yet it is a crucial skill for equity-based teaching; noticing helps teachers pay attention to how students position and identify themselves and each other.

Engaging in Community- Community engagement is powerful, in all aspects of teaching. While there are many ways to engage in your multiple communities, we highlight two specific communities here: your classroom and your teaching community.

Equity-Based Practices

Reflecting

Openness : How open am I to the different ways various cultures think about and do mathematics differently and how culture affects mathematics teaching and learning?

Self-awareness/Self-reflectiveness: How aware am I of my personal culture, beliefs, and experiences learning mathematics? How do these affect my mathematics teaching?

Commitment to Culturally Responsive Mathematics Teaching : How do I find ways to incorporate my students' cultures into my teaching and to engage them in rigorous mathematics?

Noticing

Two ways to use noticing for equity-based teaching involve attending to students' identities and building upon students' prior knowledge.

If done with care, teachers can use these noticing skills to help create culturally relevant tasks and rehumanize the mathematics classroom.

Engaging in Community

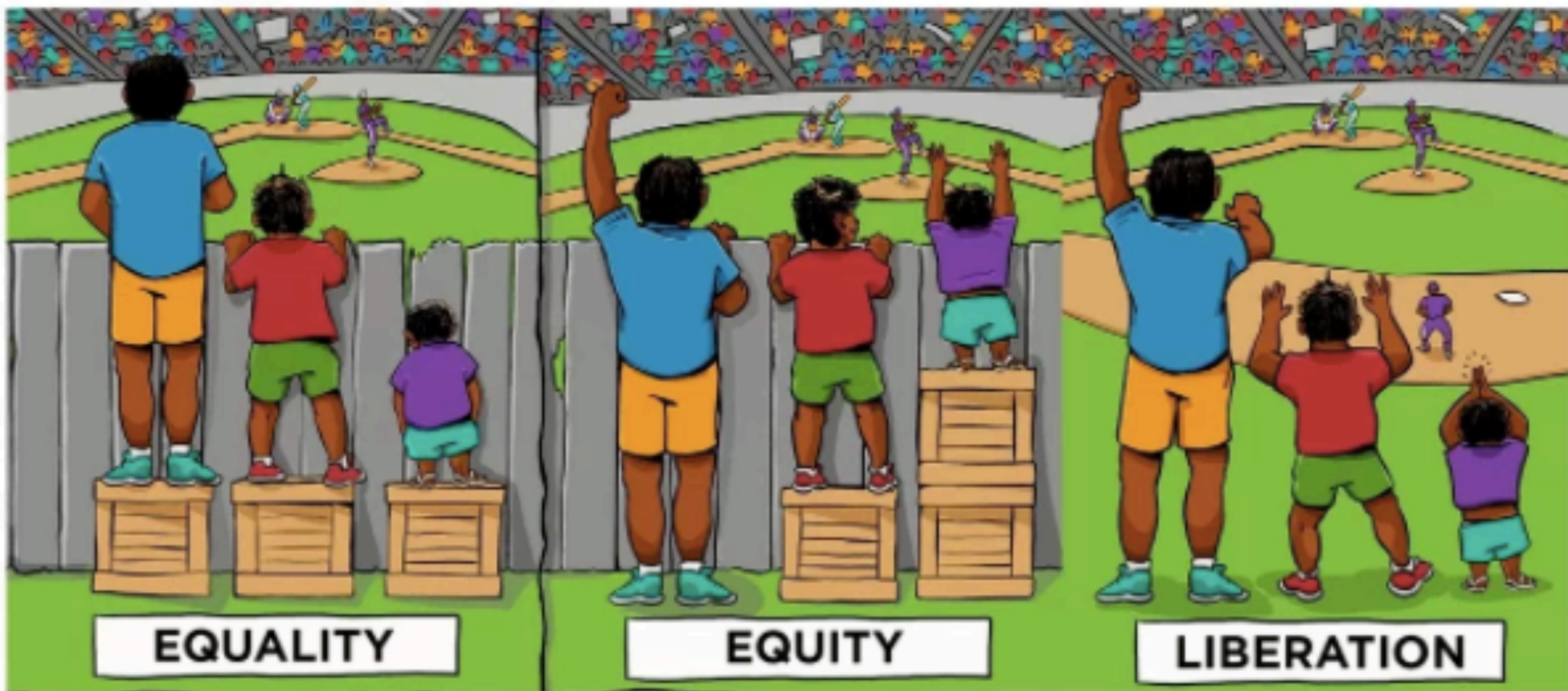
Teachers can build equity within the classroom community by employing *complex instruction* , which uses the following practices (Boaler & Staples, 2008):

Modifying expectations of success/failure through the use of tasks requiring different abilities

Assigning group roles so students are responsible for each other and contribute equally to tasks

Using group assessments to encourage students' responsibility for each other's learning and appreciation of diversity

Change The Story!



Today's Learning Targets



- I can bring voice to the conversation about equity-based practices.
- I can define “math identity” and “agency”
- I can recognize my role in helping develop students’ math identities.
- I can identify at least three strategies or practices to help nurture a positive math identity in my students.

Think about
your students...

What is their
self-talk...



“I am never going to get it,
so why bother trying?”

“Math is
boring!”



”I can’t do
math!”

”It’s okay, I have never been good at math, she got my genes.”

Equity in Schools...

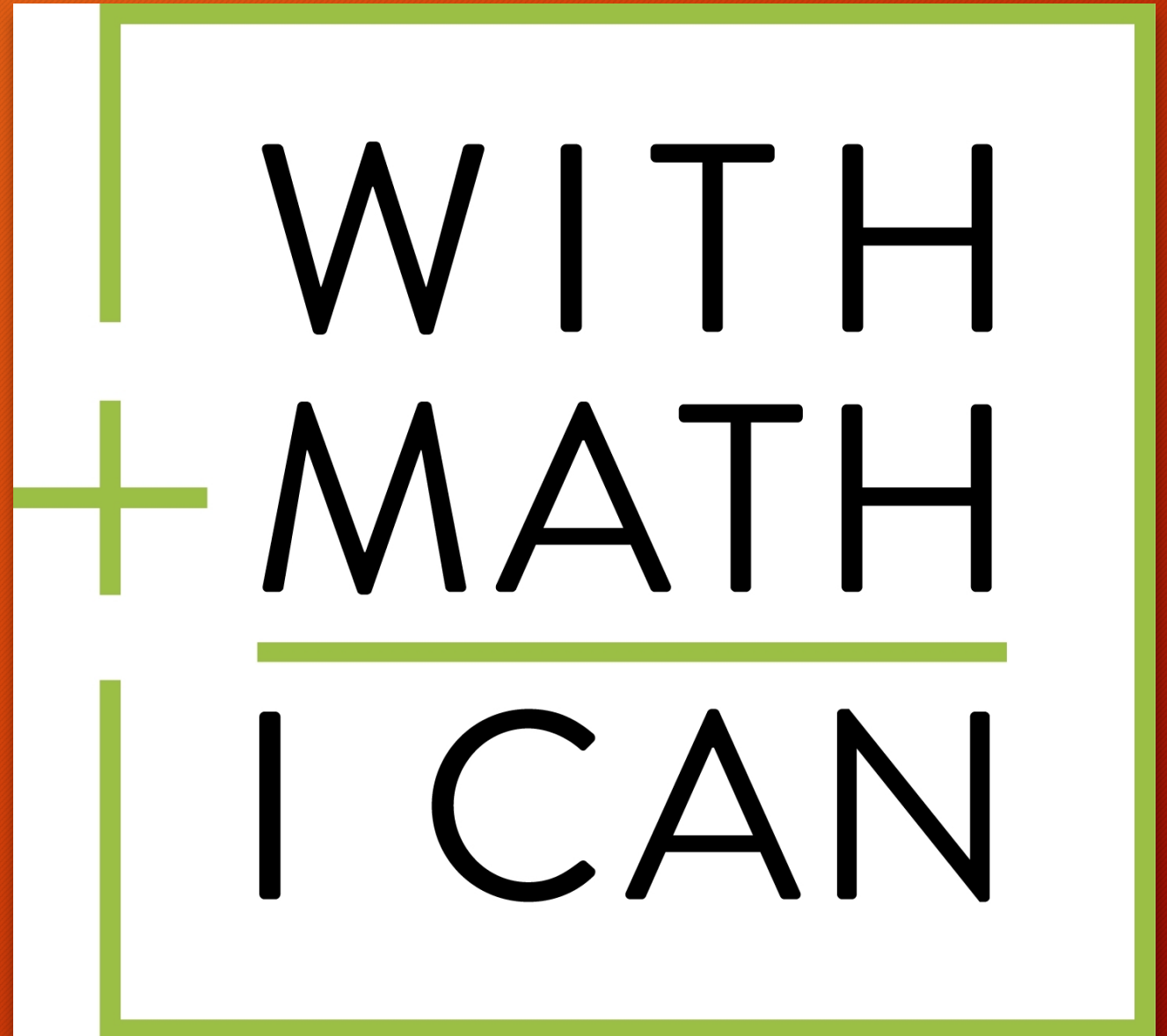
- First, we must admit and confront the history of teaching and learning in our classrooms.
- Students have been tracked by perceived ability for decades.
- Mindsets of teachers have determined students success and failure.

Equity in Schools...

- Rigorous pathways have historically been available to white students and males.
- Shorter course sequences with less rigor have been used for everyone else.
- Resources have not been available - Access has been limited by the system.

Growth Mindset

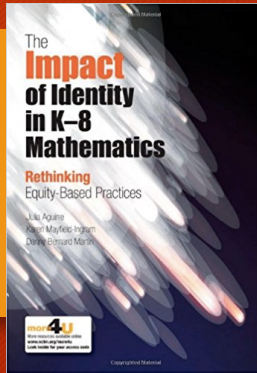
“With Math we
can do anything”



Math
Identity

Agency

Identity
Affirming



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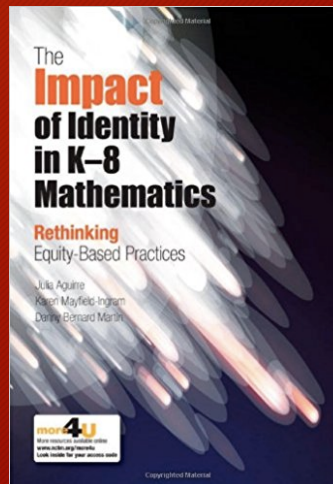
“

The dispositions and deeply held beliefs that students develop about their ability to participate and perform effectively in mathematical contexts and to use mathematics in powerful ways across the contexts of their lives.

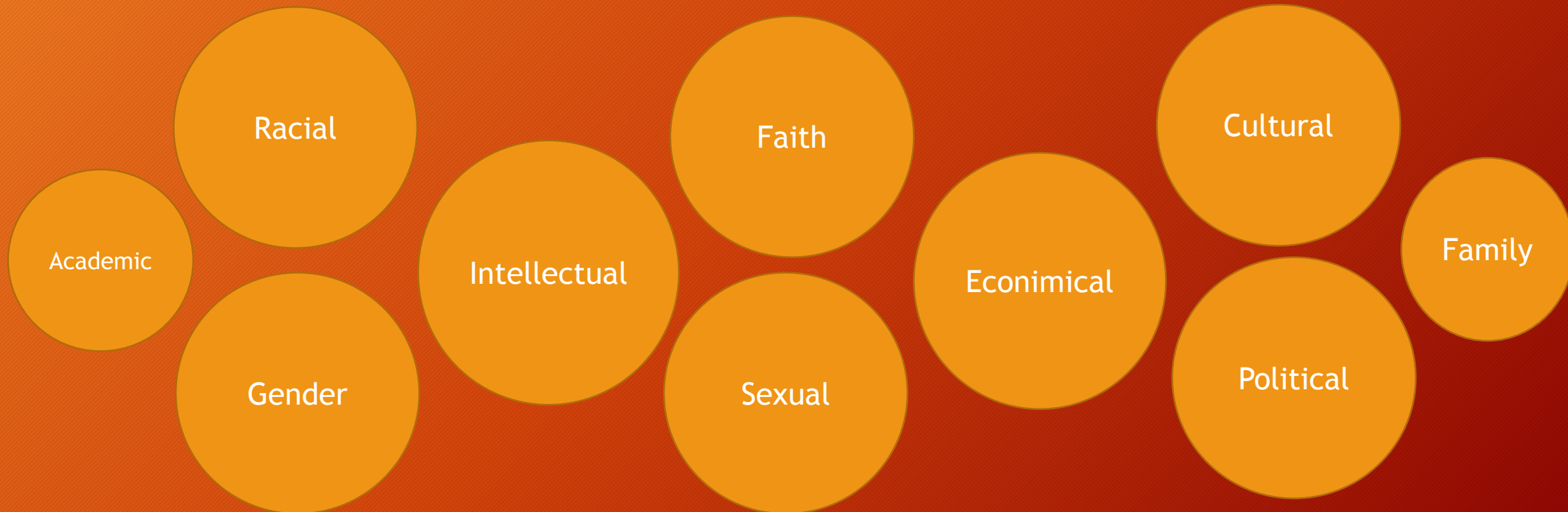
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Aguirre, Mayfield-Ingram, and Martin, 2013

Identity

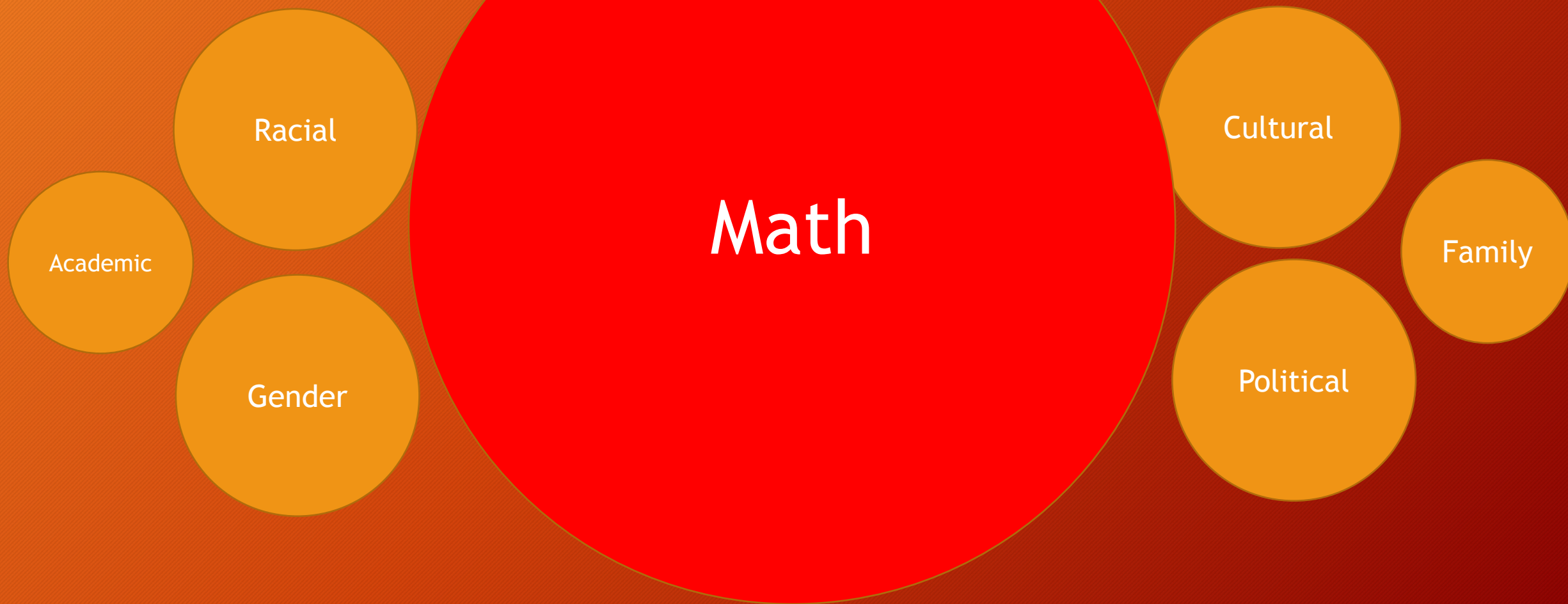


We Have Many Identities...

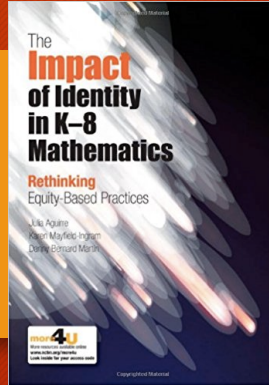


To name a few...

We Have Many Identities...



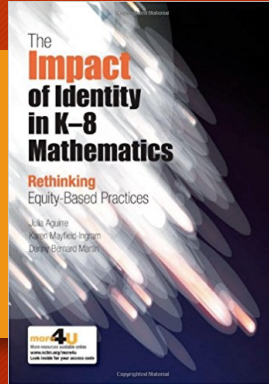
Defining “Math Identity”



Mathematics identity refers to the dispositions and deeply held beliefs that individuals develop about their ability to participate and perform effectively in mathematics to change the conditions of their lives. A mathematics identity encompasses a person's self-understandings and how they are seen by others in the context of doing mathematics.

Therefore, a mathematics identity is expressed in narrative form as a negotiated self, is always under construction, and results from the negotiation of our own assertions and the external ascriptions of others.

Defining “Math Identity”

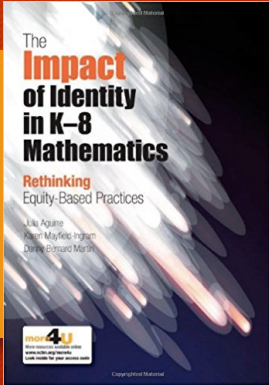


*Mathematics identity refers to the dispositions and **deeply held beliefs that** individuals **develop** about their ability to participate and perform effectively in mathematics to change the conditions of their lives. A mathematics identity encompasses a person's self-understandings and **how they are seen by others** in the context of doing mathematics.*

*Therefore, a mathematics identity is expressed in **narrative form** as a negotiated self, is **always under construction**, and results from the **negotiation** of our own assertions and the external ascriptions of others.*

(Martin, D. (2006a). Mathematics Learning and Participation as Racialized Forms of Experience: African American Parents Speak on the struggle for Mathematics Literacy, Mathematical Thinking and Learning, 8, 197-229.)

Defining “Math Identity” cont.



Math Identity...

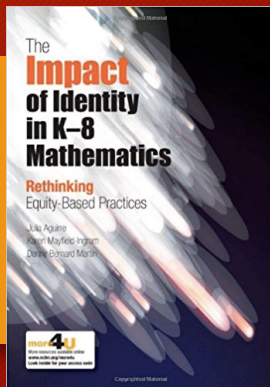
- Deeply held beliefs
- It is shaped by how we believe others perceive us
- It is under constant construction

...We can be a part of reshaping an identity.

“Agency is our identity in action and the presentation of our identity to the world.”

Aguirre, Mayfield-Ingram, and Martin, 2013

Agency



Agency

- Social and behavioral expectations are associated with agency.
- If one identifies himself as being smart and good at mathematics, then he presents himself and adopt behaviors and actions of smartness and being good at mathematics.
- Once this presentation of smartness and being good at mathematics is affirmed, then students see themselves as active participants and doers of mathematics (Berry, 2014).

Aguirre, Ingram & Martin, 2013

NOW!

We are a society focused on...

YET!!!

We need to foster a culture of...

Understanding Failure

“It’s not about whether you can or can’t make the shot... It’s about practicing until you can make the shot AND having the confidence to try and try again!”

Dr. Helen Quinn, 2018



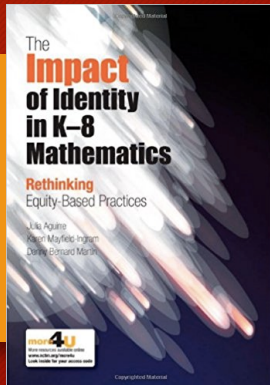
Understanding Failure cont.

- Punitive failure closes doors to learning.
- Celebrated failure is an opportunity to understand that failure is a part of learning.
- Failure, in an safe environment fosters motivation and perseverance.

How is failure perceived in your classroom?



Affirming Identity



Identity Affirming

- Identity-affirming behaviors influence the ways in which students participate in mathematics and how they see themselves as doers of mathematics.
- We see identity-affirming criteria emerging as learners are labeled as “smart,” “gifted,” “proficient,” “at-risk,” or “on grade-level”

Identity Affirming

- We affirm mathematics identities by providing opportunities for students to make sense of and persevere in challenging mathematics.
 - Facilitate meaningful mathematical discourse
 - Support productive struggle in learning mathematics
 - Elicit and use evidence of student thinking
 - This kind of teaching cultivates and affirms mathematical participation and behaviors

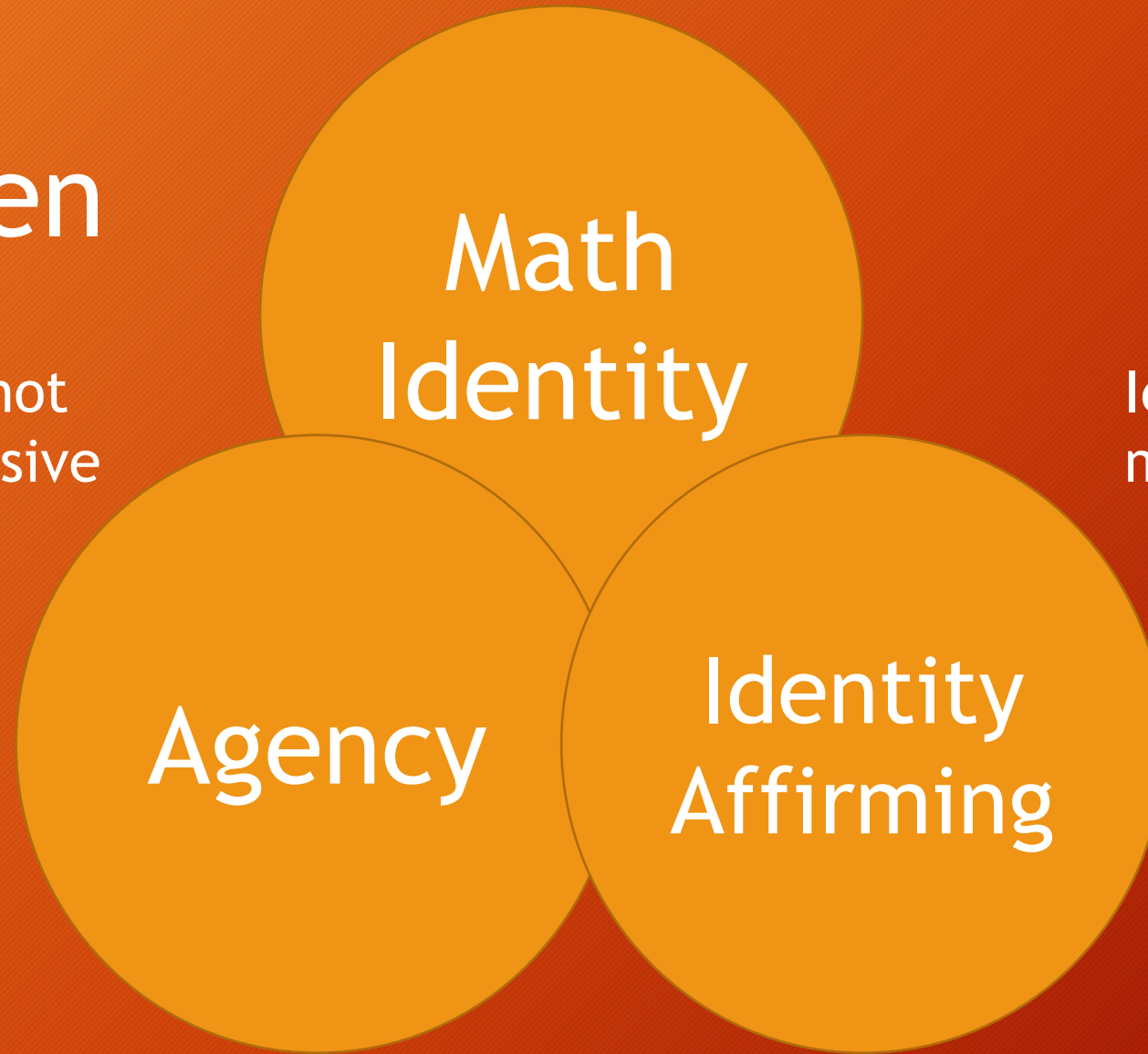


Identity Affirming

- Students need opportunities to learn using their strengths and opportunities to learn by compensating for their the challenges (Sternberg, 2007)
 - We must provide opportunities that play to the strengths and challenges of students.

Interwoven

Identities are not mutually exclusive



Identities serve as motivation to persevere

What is mathematics? For whom?

- Critical Thinking
- Problem Solving
- Analytical Thinking
- Quantitative Reasoning
- Ability to Manipulate Precise and Intricate Ideas
- Construct Logical Arguments
- Expose Illogical Arguments
- Communication
- Teamwork and Collaboration
- Independence & Time Management



What is the purpose of learning mathematics?

Mathematics provides a critical lens for discerning patterns and making sense of quantitative information that we use in everyday life.



Top Skills Needed for Careers



TOP SKILLS IN 2015

1. Complex problem-solving
2. Coordinating with others
3. People management
4. Critical thinking
5. Negotiation
6. Quality control
7. Service orientation
8. Judgement and decision-making
9. Active listening
10. Creativity

TOP SKILLS IN 2020

1. Complex problem-solving
2. Critical thinking
3. Creativity
4. People management
5. Coordinating with others
6. Emotional intelligence
7. Judgement and decision-making
8. Service orientation
9. Negotiation
10. Cognitive flexibility

Source: Future of Jobs Report, World Economic Forum

Top Skills Needed for Careers



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Source: Future of Jobs Report, World Economic Forum

Know Thyself - It Begins With Me

- Share your math story
- Listen to their math stories
- Have students create a mathographic
- Have students write a mathography
- Encourage and model reflecting and noticing.

What's Your Math Story?

BEST	CHALLENGES
WORST	SUCCSSES

A group of children are sitting around a round wooden table, engaged in a math activity. They are using small, colorful geometric blocks (cubes and prisms) to build structures. Several worksheets are spread out on the table, some with math problems. One child in the foreground is wearing a blue and white striped shirt and is looking down at the blocks. Another child in the background is wearing a white shirt with 'KEKE' on it. The scene is set in a classroom or activity room with a carpeted floor and a black office chair visible in the background.

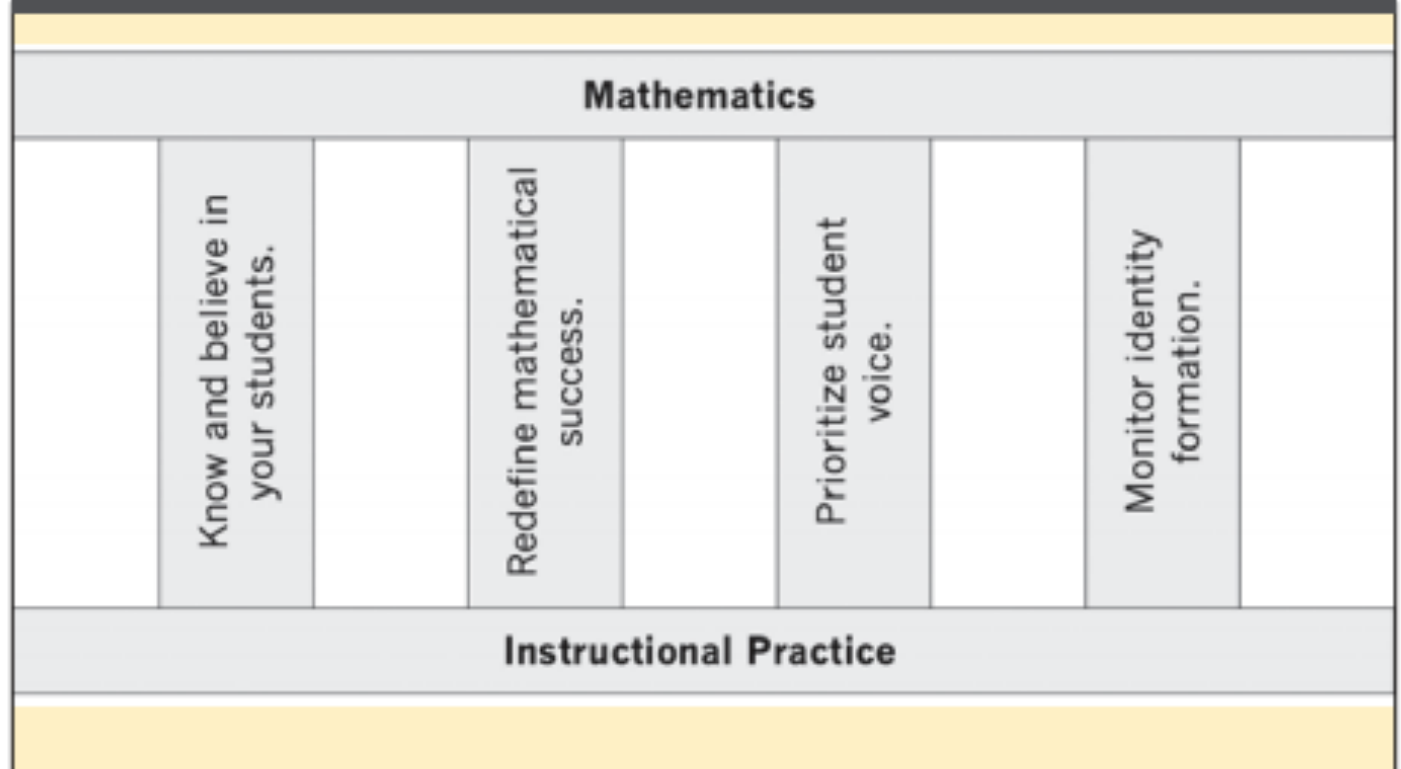
Practices and Strategies

Taking It To Action

Four Pillars to Support Mathematics Identities

- Know and believe in your students.
- Redefine mathematical success.
- Prioritize student voice.
- Monitor identity formation.

Fig. 1 These four pillars of practice are meant to support mathematics identity.



1. Questioning

Limit broadcast questioning.

Asking questions of the whole class and then calling on one student among the first raised hands is a habit all math teachers need to break because it inevitably privileges the voices of a small group of students.

Instead, give students a chance to write or talk to a partner before anyone speaks publically.



2. Routines

Be Intentional

Establish routines that help students develop ideas privately and express them in a small group before presenting publicly. Such subtle shifts as having students “think-pair-share” in the midst of a class discussion or using roles in groups rather than simply asking students to work together can have a huge impact because they ensure that every child has a way to take part in the collective work.



3. Redefine Mathematical Success

Name and Make Public the Skills and Learning to Take Place

- Representing an idea in a new way
- Asking an insightful question
- Listening carefully and restating someone's thinking
- Making a systematic list
- Talking about an idea before writing it down
- Using or interpreting a graph
- Breaking a complex task down into smaller ones
- Working with the calculator
- Relating a new problem to a previous problem
- Connecting multiple ideas
- Using symbols to communicate an idea
- Drawing a diagram or picture

Redefining Mathematical Success

Teaching Productive Math Talk Skills to Support Success

1. Helping individuals clarify and share their own thoughts.
2. Helping students orient to the thinking of others
3. Helping students deepen their own reasoning
4. Help students engage with the reasoning of others.

4. Assessment

Leverage formative assessment and self-assessment

Have students do a mid-lesson “fist to five.” Every student or one from each group holds up a hand, showing a fist or a number of fingers to indicate the extent to which the student or the group is ready to move on.

When using this scale, a fist means “I/we need help” and five fingers means “I/we can help another student or group.”



5. Goals & Learning Targets

Have students help set goals and write learning targets

When only the teacher sets goals for the class, math can feel like something being “done to students” rather than something they do.

Asking students to participate in goal setting can shift the power dynamic and send strong messages about the confidence we have in our students.



Actions: Principals, Coaches & Specialists

- Consider teacher assignment practices to ensure that struggling students have access to effective mathematics teaching...
- Maintain a school-wide culture with high expectations and a growth mindset.
- Develop and implement high-quality interventions.
- Ensure that curricular and extracurricular resources are available to support and challenge all students.

Action: Teachers

- Develop socially, emotionally, and academically safe environments for mathematics teaching and learning...
- Understand and use the social contexts, cultural backgrounds, and identities of students as resources to foster access, motivate students to learn more mathematics, and engage student interest.
- Model high expectations for each student's success in problem solving, reasoning, and understanding.
- Promote the development of a growth mindset among students.

Reflection

- How can you apply any of what you heard or learned today to your practices as an educator?
- As a developing educator, what steps will you take to incorporate practices of reflecting, noticing, and engaging students in your classroom community?
- What is one thing you will do differently on Monday?

DID YOU SERIOUSLY JUST
ASK YOUR MATH TEACHER

FINISH MATH



PRETEND TO
WORK ON IT TO AVOID
GETTING CALLED ON

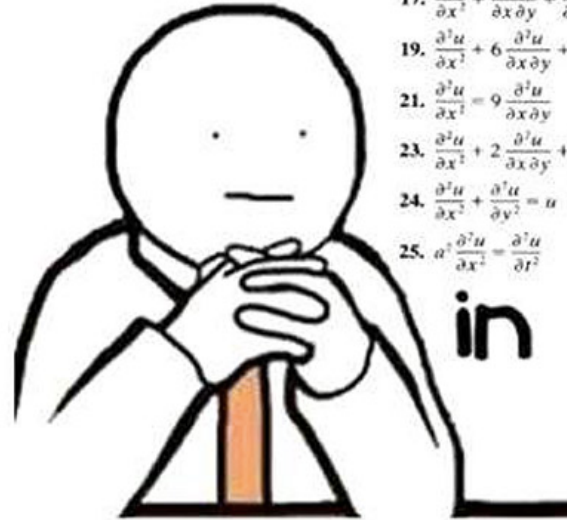
memegenerator.net

MA
Menta
Abuse
To
Humans.



fh.com/minionquote

I'm still waiting for the
day that I will actually use



17. $\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial x \partial y} + \frac{\partial^2 u}{\partial y^2} = 0$ 18. $3 \frac{\partial^2 u}{\partial x^2} + 5 \frac{\partial^2 u}{\partial x \partial y} + \frac{\partial^2 u}{\partial y^2} = 0$
19. $\frac{\partial^2 u}{\partial x^2} + 6 \frac{\partial^2 u}{\partial x \partial y} + 9 \frac{\partial^2 u}{\partial y^2} = 0$ 20. $\frac{\partial^2 u}{\partial x^2} - \frac{\partial^2 u}{\partial x \partial y} - 3 \frac{\partial^2 u}{\partial y^2} = 0$
21. $\frac{\partial^2 u}{\partial x^2} = 9 \frac{\partial^2 u}{\partial x \partial y}$ 22. $\frac{\partial^2 u}{\partial x \partial y} - \frac{\partial^2 u}{\partial y^2} + 2 \frac{\partial u}{\partial x} = 0$
23. $\frac{\partial^2 u}{\partial x^2} + 2 \frac{\partial^2 u}{\partial x \partial y} + \frac{\partial^2 u}{\partial y^2} + \frac{\partial u}{\partial x} - 6 \frac{\partial u}{\partial y} = 0$
24. $\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} = u$
25. $a^2 \frac{\partial^2 u}{\partial x^2} = \frac{\partial^2 u}{\partial t^2}$ 26. $k \frac{\partial^2 u}{\partial x^2} = \frac{\partial u}{\partial t}, k > 0$

in real life

STARECAT.COM

the roof? Purple,
because aliens don't
wear hats.

your eCards
someecards.com



blems: If
ave 7



...Self Talk Matters

Thank You 😊

*Catherine Vittorio, Math Coordinator
San Bernardino County Superintendent of Schools
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